

TRANSMITTAL LETTER TO THE UNITED STATES  
DESIGNATED/ELECTED OFFICE (DO/EO/US)  
CONCERNING A FILING UNDER 35 U.S.C. 371

194339US

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR

09/601327

INTERNATIONAL APPLICATION NO.

PCT/FR99/03036

INTERNATIONAL FILING DATE

07 DECEMBER 1999

PRIORITY DATE CLAIMED

08 DECEMBER 1998

TITLE OF INVENTION

ENCAPSULATED SURFACE ACOUSTIC WAVE COMPONENT AND METHOD OF COLLECTIVE  
FABRICATION

APPLICANT(S) FOR DO/EO/US

Agnes BIDARD, et al

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This is an express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. ☐ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of the International Application as filed (35 U.S.C. 371 (c) (2))
  - a. ☐ is transmitted herewith (required only if not transmitted by the International Bureau).
  - b. ☒ has been transmitted by the International Bureau.
  - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. ☒ A copy of the International Search Report (PCT/ISA/210).
8. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3))
  - a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
  - b. ☐ have been transmitted by the International Bureau.
  - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
  - d. ☒ have not been made and will not be made.
9. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
10. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)).
11. ☐ A copy of the International Preliminary Examination Report (PCT/IPEA/409).
12. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5)).

**Items 13 to 18 below concern document(s) or information included:**

13. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
14. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
15. ☒ A **FIRST** preliminary amendment.  
A **SECOND** or **SUBSEQUENT** preliminary amendment.
16. ☐ A substitute specification.
17. ☐ A change of power of attorney and/or address letter.
18. ☐ Certificate of Mailing by Express Mail
19. ☒ Other items or information:

**Notice of Priority**

PCT/IB/304

PCT/IB/308

Drawings (3 sheets)

Form PTO 1449

List of Related Cases

Cited References (10)

Request For Consideration of Documents Cited in International Search Report

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR <div style="font-size: 2em; font-weight: bold; margin-top: 5px;">09/601327</div>		INTERNATIONAL APPLICATION NO. <div style="font-weight: bold; margin-top: 5px;">PCT/FR99/03036</div>		ATTORNEY'S DOCKET NUMBER <div style="font-weight: bold; margin-top: 5px;">194339US</div>	
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20. The following fees are submitted: <b>BASIC NATIONAL FEE ( 37 CFR 1.492 (a) (1) - (5)) :</b> <input checked="" type="checkbox"/> Search Report has been prepared by the EPO or JPO ..... <span style="float: right;">\$840.00</span> <input type="checkbox"/> International preliminary examination fee paid to USPTO (37 CFR 1.482) ..... <span style="float: right;">\$670.00</span> <input type="checkbox"/> No international preliminary examination fee paid to USPTO (37 CFR 1.482) but international search fee paid to USPTO (37 CFR 1.445(a)(2)) ..... <span style="float: right;">\$760.00</span> <input type="checkbox"/> Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO ..... <span style="float: right;">\$970.00</span> <input type="checkbox"/> International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(2)-(4) ..... <span style="float: right;">\$96.00</span> <div style="text-align: center; margin-top: 10px;"><b>ENTER APPROPRIATE BASIC FEE AMOUNT =</b></div>				<b>CALCULATIONS PTO USE ONLY</b> <div style="border: 1px solid black; height: 100px; width: 100%;"></div>	
Surcharge of <b>\$130.00</b> for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492 (e)).				<div style="border: 1px solid black; padding: 2px;">\$840.00</div> <div style="border: 1px solid black; padding: 2px;">\$0.00</div>	
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	14 - 20 =	0	x \$18.00	\$0.00	
Independent claims	1 - 3 =	0	x \$78.00	\$0.00	
Multiple Dependent Claims (check if applicable). <input type="checkbox"/>				\$0.00	
<b>TOTAL OF ABOVE CALCULATIONS =</b>				\$840.00	
Reduction of 1/2 for filing by small entity, if applicable. Verified Small Entity Statement must also be filed (Note 37 CFR 1.9, 1.27, 1.28) (check if applicable). <input type="checkbox"/>				\$0.00	
<b>SUBTOTAL =</b>				\$840.00	
Processing fee of <b>\$130.00</b> for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492 (f)).				\$0.00	
<b>TOTAL NATIONAL FEE =</b>				\$840.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) (check if applicable). <input type="checkbox"/>				\$0.00	
<b>TOTAL FEES ENCLOSED =</b>				\$840.00	
				Amount to be: refunded	\$
				charged	\$



  

☒ A check in the amount of **\$840.00** to cover the above fees is enclosed.  
  
☐ Please charge my Deposit Account No. \_\_\_\_\_ in the amount of \_\_\_\_\_ to cover the above fees.  
 A duplicate copy of this sheet is enclosed.  
  
☒ The Commissioner is hereby authorized to charge any fees which may be required, or credit any overpayment to Deposit Account No. **15-0030** A duplicate copy of this sheet is enclosed.

**NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.**

SEND ALL CORRESPONDENCE TO:

<div style="text-align: right;">NEUSTADT, P.C.</div> <div style="text-align: center;">   <div style="font-size: 1.5em; font-weight: bold;">22850</div> </div> <div style="margin-top: 10px;">         Telephone Number (703) 413-3000          Facsimile Number (703) 413-2220       </div> <div style="text-align: right; margin-top: 20px;"> <b>Surinder Sachar</b>          Registration No. 34,423       </div>	<div style="text-align: center; margin-bottom: 10px;">           SIGNATURE       </div> <div style="text-align: center; margin-bottom: 10px;"> <b>Marvin J. Spivak</b>          NAME       </div> <div style="text-align: center; margin-bottom: 10px;"> <b>24,913</b>          REGISTRATION NUMBER       </div> <div style="text-align: center;"> <div style="margin-bottom: 5px;"><i>Aug. 8, 2000</i></div>         DATE       </div>
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194339US2PCT

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF :  
AGNES BIDARD ET AL : ATTN: APPLICATION DIVISION  
SERIAL NO: NEW U.S. PCT APPLICATION :  
(Based on PCT/FR99/03036)  
FILED: HEREWITH :  
FOR: ENCAPSULATED SURFACE  
ACOUSTIC WAVE COMPONENT  
AND METHOD OF COLLECTIVE  
FABRICATION

PRELIMINARY AMENDMENT

ASSISTANT COMMISSIONER FOR PATENTS  
WASHINGTON, D.C. 20231

SIR:

Prior to a first examination on the merits, please amend the above-identified  
application as follows:

IN THE SPECIFICATION

Page 1, before line 1, insert --TITLE OF THE INVENTION--;

between lines 2-3, insert the following:

--BACKGROUND OF THE INVENTION

Field of the Invention--;

between lines 11-12, insert --Discussion of the Background--.

Page 2, before line 1, insert the following:

--SUMMARY OF THE INVENTION--.

Page 3, between lines 17-18, insert the following:

--BRIEF DESCRIPTION OF THE DRAWINGS--;

between lines 26-27, insert the following:

--DESCRIPTION OF THE PREFERRED EMBODIMENTS--.

IN THE CLAIMS

Please amend the claims as follows:

Claim 3, lines 1-2, replace "one of the claims 1 or 2" with --claim 1--.

Claim 4, lines 1-2, replace "one of the claims 1 to 3" with --claim 1--.

Claim 5, lines 1-2, replace "one of the claims 1 to 4" with --claim 1--.

Claim 6, lines 1-2, replace "one of the claims 1 to 5" with --claim 1--.

Claim 7, line 2, replace "one of the claims 1 to 6" with --claim 1--.

Claim 10, line 2, replace "one of the claims 7 to 9" with --claim 7--.

Claim 11, line 2, replace "one of the claims 7 to 10" with --claim 7--.

IN THE ABSTRACT

Please delete the Abstract page 10 in its entirety and insert therefor:

--ABSTRACT OF THE DISCLOSURE

An encapsulated surface acoustic wave component and a method for the batch production of such a component. The component includes a surface acoustic wave device on the surface of a substrate. The encapsulation package furthermore includes the substrate, a first layer located on the substrate and hollowed out locally at least at the level of the active surface of the surface acoustic wave device, a printed circuit covering an entire first layer, and

conductive via holes going through the unit formed by the first layer and the printed circuit so as to provide for the electrical connection of the surface acoustic wave device from the exterior.--

#### REMARKS

Favorable consideration of this application, as presently amended, is respectfully requested.

The present Preliminary Amendment is submitted to place the above-identified application in more proper format under United States practice. By the present Preliminary Amendment the specification has been amended to include suggested headings. The claims have been amended to no longer recite any multiple dependencies. A new abstract believed to be in more proper format under United States practice is also submitted herein.

The present application is believed to be in condition for a full and thorough examination on the merits. An early and favorable consideration of the present application is hereby respectfully requested.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,  
MAIER & NEUSTADT, P.C.



Gregory J. Maier  
Attorney of Record  
Registration No. 25,599  
Surinder Sachar  
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## ENCAPSULATED SURFACE ACOUSTIC WAVE COMPONENT AND METHOD OF COLLECTIVE FABRICATION

The field of the invention is that of surface acoustic wave devices especially that of the filters known as SAW (surface acoustic wave) filters that are used for the highly selective filtering of frequency bands. These components are designed for portable equipment such as radiotelephones, and it is essential to miniaturize them and their protective packaging.

Furthermore, since acoustic waves propagate in the vicinity of the surface of the piezoelectric substrate, this surface must be left vacant so as not to disturb the propagation of the waves. This is an additional constraint with regard to encapsulation packages.

The present encapsulation technologies for surface acoustic wave filters are based on a package formed by two parts as shown in Figure 1: a ceramic or organic base 01 and a ceramic, metallic or organic lid 02 whose closure by soldering or bonding provides for the hermetic sealing of the component while making the necessary cavity. In this type of package, the surface acoustic wave devices (or SAW devices) 03 can be assembled by being bonded to the base. The electrical connections between the internal contacts 011, 012 of the SAW device and the external contacts 071 and 072 are provided by metallized via holes through the base 01.

Figure 1 illustrates an example of the prior art in which the electrical connections of the SAW device with the exterior are wire-type connections. For greater compactness, the technology used at present is the flip-chip technology (in which the component is flipped over). Figure 2 shows an example of a prior art encapsulated SAW device which is a variant of Figure 1.

In order to meet the requirements of large-scale consumer markets (in radiotelephony, automobiles, etc.), the new encapsulation technologies must make the filters increasingly small while at the same time reducing their manufacturing costs. As in the case of other components, the trend is towards the ever greater compactness of the packages in order to obtain a component/package assembly whose surface area is equal to that of the chip by itself.

The present invention meets these requirements by proposing a surface acoustic wave device in a tightly sealed cavity that has a micro-lid on the piezoelectric substrate alone, without increasing its surface area.

More specifically, an object of the invention is a surface acoustic wave component comprising at least one surface acoustic wave device encapsulated in a package, said device being made on the surface of a piezoelectric substrate by means of interdigitated electrodes powered by first conductive contacts internal to the surface of the substrate, characterized in that the package comprises, in addition to the substrate:

- a first layer located on the substrate and hollowed out locally at least at the level of the active surface of the surface acoustic wave device;
- a printed circuit covering the entire first layer, said printed circuit comprising second external conductive contacts;
- conductive via holes going through the unit formed by the first layer/printed circuit and connecting the first internal conductive contacts to the second external conductive contacts.

Advantageously, the first layer is made of resin and the via holes made in the first layer are used to make electrical connections between the surface acoustic wave devices and the micro-lid constituted by the printed circuit so as to provide for component transfer zones.

Furthermore, advantageously, the constituent resin of the first layer may locally replace the sound absorbent deposit.

The height of the module is reduced to the thickness of the printed circuit which typically may be in the range of 25 to 100 microns, the thickness of the first layer which is typically in the range of some tens of microns and the thickness of the piezoelectric substrate (some hundreds of microns).

An object of the invention is also a method for the collective fabrication of components comprising the making of surface acoustic wave devices on a piezoelectric substrate and comprising the following steps:

- the making of a first hollowed layer on all the surface acoustic wave devices;
- the bonding of a printed circuit to said first layer;
- the making of via holes in the printed circuit and the first layer at the level of the first internal conductive contacts of the surface acoustic wave devices;



- the metallizing of the via holes and the defining of second external conductive contacts, said second contacts being connected to said first contacts by the metallized via holes;

- the cutting out of the unit formed by the substrate, the first layer and the printed circuit so as to separate the surface acoustic wave components.

The hollowed layer can be obtained by the preliminary deposition of a uniform layer followed by etching, or else by the lamination of a previously hollowed layer or else again by silk-screen printing.

Advantageously, the first layer may have acoustic absorbent properties.

In the manufacture of surface acoustic wave devices, the method of the invention has the advantage of being a method of collective fabrication on a piezoelectric substrate. This leads to a major reduction in cost. Furthermore, a batch production method of this kind is compatible with the technologies commonly used for semiconductors (the use of masking resin, and the photolithography method).

The invention will be understood more clearly and other advantages will appear from the following description, given as a non-restrictive example, and from the appended drawings, of which:

- Figures 1 and 2 illustrate surface acoustic wave devices encapsulated according to prior art techniques;
- Figure 3 illustrates an encapsulated SAW device module;
- Figures 4a-4g illustrate the main steps of the method of collective fabrication of encapsulated SAW devices according to the invention.

In general, the surface acoustic wave device may be a transducer, a resonator comprising at least one array and a transducer. In any case, it is obtained by the deposition of electrodes on the surface of a piezoelectric substrate. To enable the propagation of surface acoustic waves, it is then sought to create an unoccupied cavity above the electrodes corresponding to the active surface of the component. While it is highly compact, the component of the invention is used to preserve the cavity in an unoccupied state as can be seen in Figure 3. The piezoelectric substrate 13 has electrodes on the surface which are not shown. These electrodes are at the

level of the surface known as the active surface 14. The active surface is insulated from the exterior by the first layer 11 which lies on the piezoelectric substrate. A printed circuit 12 provides for tight sealing on the upper face. In the drawing shown herein, a transducer with two internal electrical power supply contacts 111 and 112 may be connected from the exterior by means of external upper contacts 171 and 172 and conductive via holes going through the printed circuit as well as the first layer. In the case of a more complex component that has to be powered by more than two sources, the number of via holes and contacts may be adjusted appropriately. The active surface acoustic wave component 14 may be considered to be encapsulated in a package defined by all the following elements: the piezoelectric substrate, the first layer 11 and the printed circuit 12.

A more detailed description is given here below of the steps of an exemplary method of collective fabrication used to obtain the components of the invention.

#### The printed circuit

A copper-coated laminated type of printed circuit, impregnated with polyimide resin or with epoxy based on unwoven alomode fibers may be used. The metallized face is used for the subsequent definition of the via holes. The nature of the printed circuit, namely the organic fibers, enables the material thus reinforced to combine high dimensional stability and a low coefficient of thermal expansion in the plane with low permittivity and low surface roughness. Finally, the aramide fibers are compatible with the drilling and metallizing of small-sized holes.

Preferably, the printed circuit, on the face opposite to the metallized surface, has a second layer of insulating adhesive material that may be pre-bonded. Figure 4a illustrates the three constituent layers of the printed circuit used in the invention, the metal layer 120, the printed circuit 12 and the adhesive layer 121.

#### Making of the cavities above the active surfaces of the SAW devices

A photosensitive epoxy resin type of constituent resin of the first layer 11 is deposited by spin coating on the piezoelectric substrate. After an annealing operation, the resin is photoimaged and then undergoes a second annealing operation. After development, the substrate and then the resin are put into a stove. Figure 4b illustrates the piezoelectric substrate 13

comprising SAW devices whose active surfaces 14 are cleared of resin 11. The resin remains, especially on the internal conductive contacts of the SAW devices 111 and 112. For easy representation, only two SAW devices are shown but the piezoelectric substrate has an entire set of them.

#### Bonding of the printed circuit to the layer 11

More specifically, this is a step for pressing the circuit shown schematically in Figure 4a to the substrate which locally comprises the resin and is shown schematically in Figure 4b. The two elements are pressed under heat for example in an autoclave. Typically, the heat cycle is adapted so as to relieve the stresses of the materials that are present and prevent heat shocks.

#### Making the connection system

##### *Etching of the conductive layer 120 to make the via holes*

After a surface preparation (namely the degreasing and micro-etching) of the layer, which is typically made of copper, to increase the surface roughness of the copper and hence its adhesion, a photosensitive resin is deposited by spin coating on the copper-coated layer 120. The resin is insulated vertically with respect to the via holes with a photo-insolator. The insulation time is a function of the resin thickness. The copper that is not protected by the resin is dissolved for example in an ammonia solution. The resin is then removed for example with acetone and alcohol. A mask is thus defined in the layer 120 (Figure 4c).

##### *Ablation of the assembly formed by the printed circuit, adhesive layer and resin through the copper mask*

The making of via holes through the assembly can be done for example by excimer or CO<sub>2</sub> laser and then terminated for example by RIE (reactive ionic etching) with oxygen plasma. The via holes are shown in Figure 4d.

### *Metallization of the surface of the substrate and the vias*

After the ablation of the vias, the copper mask may be etched if necessary. Then the circuit is then metallized by sputtering for example. A layer of chromium and then copper 122 for example, with a thickness of some microns, is deposited uniformly throughout the surface of the printed circuit and inside the holes. The cycle performed in the stand uses sputtering and may typically be as follows:

- an argon plasma operation to mechanically etch the fine layer of native aluminum oxide if need be;
- a sputtering of chromium: the chromium layer plays the role of a barrier layer;
- a sputtering of copper.

It is then possible to carry out an electrolytic copper recharging to increase the thickness of the metallization to a few tens of microns and thus increase the thermomechanical stability of the via holes (Figure 4e).

### *The making of the external conductive contacts*

A photosensitive resin is deposited on the entire conductive surface (substrate + via holes). The resin is insulated vertically with respect to the external contacts with a photoinsolator so as to leave resin on the external conductive contacts, also known as "pads", around the via holes and resin fitting itself to the shape of the walls of the via holes (in the case of a positive resin).

The copper not protected by resin is chemically etched. The resin is then removed for example with acetone and alcohol.

Thus, all the encapsulated components are obtained as a batch with external connection contacts as shown in Figure 4f.

### *Cutting out of individual components*

Then, the components are cut out mechanically. It is possible to deposit a third layer 18 providing hermetic sealing of the assembly with the

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This protection may serve as a mechanical protection, a base for markings, an electromagnetic shielding and/or a hermetically sealed type of protection against the environment.

## CLAIMS :

1. A surface acoustic wave component comprising at least one surface acoustic wave device encapsulated in a package, said device being made on the surface of a piezoelectric substrate by means of interdigitated electrodes powered by first conductive contacts internal to the surface of the substrate, characterized in that the package comprises, in addition to the substrate:

- a first layer located on the substrate and hollowed out locally at least at the level of the active surface of the surface acoustic wave device;

- a printed circuit covering the entire first layer, said printed circuit comprising second external conductive contacts;

- conductive via holes going through the unit formed by the first layer/printed circuit and connecting the first internal conductive contacts to the second external conductive contacts.

2. Surface acoustic wave component according to claim 1, characterized in that the first layer is made of photosensitive resin.

3. Surface acoustic wave component according to one of the claims 1 or 2, characterized in that the package has a second layer, called an adhesive layer, located between the first layer and the printed circuit.

4. Surface acoustic wave component according to one of the claims 1 to 3, characterized in that the external face of the substrate and the side faces of the component are covered with a third layer that is hermetic.

5. Surface acoustic wave component according to one of the claims 1 to 4, characterized in that the printed circuit is metallized on the surface.

6. Surface acoustic wave component according to one of the claims 1 to 5, characterized in that the first layer has acoustic absorbent properties.

7. Method for the collective fabrication of surface acoustic wave components according to one of the claims 1 to 6, comprising the making of surface acoustic wave devices on a piezoelectric substrate and comprising the following steps:

- the making of a first hollowed layer on all the surface acoustic wave devices;

- the bonding of a printed circuit to said first layer;

- the making of via holes in the printed circuit and the first layer at the level of the first internal conductive contacts of the surface acoustic wave devices;

- the metallizing of the via holes and the defining of second external conductive contacts, said second contacts being connected to said first contacts by the metallized via holes;

- the cutting out of the assembly formed by the substrate, the first layer and the printed circuit so as to separate the surface acoustic wave components.

8. Method for the collective fabrication of components according to claim 7, characterized in that the making of the first hollowed layer is obtained by the preliminary deposition of a uniform layer, followed by the etching of said layer.

9. Method for the collective fabrication of components, according to claim 7, characterized in that the making of the first layer is obtained by the lamination of a previously hollowed out layer.

10. Method for the collective fabrication of modules of components according to one of the claims 7 to 9, characterized in that the bonding of the printed circuit to the first layer comprises:

- the deposition of a second layer, known as an adhesive layer, on the printed circuit;
- the hot pressing of the printed circuit/second layer on the entire unit formed by the first layer and the piezoelectric substrate.

11. Method for the collective fabrication of components according to one of the claims 7 to 10, characterized in that it comprises the making of a third layer, called a coating layer, on the lower face of the substrate and on the side faces of the component.

12. Method of collective fabrication according to claim 11, characterized in that the third layer is made by sputtering.

13. Method of collective fabrication according to claim 11, characterized in that the third layer is made by the vapor phase deposition of a parylene type polymer.

14. Method of collective fabrication according to claim 11, characterized in that the third layer is obtained by the deposition of a varnish.

ENCAPSULATED SURFACE ACOUSTIC WAVE COMPONENT AND  
METHOD OF COLLECTIVE FABRICATION

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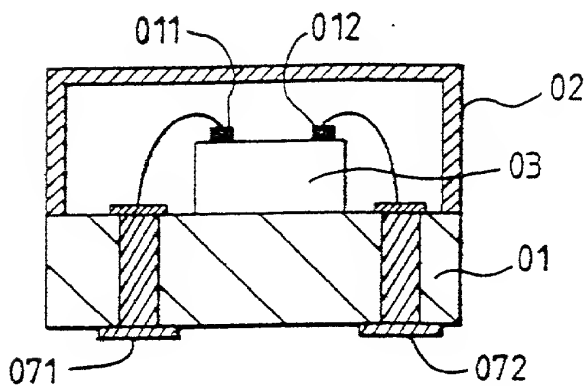


FIG. 1

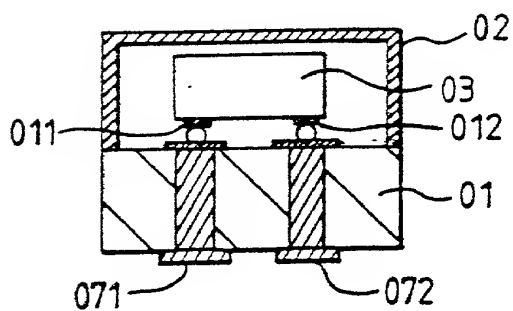


FIG. 2

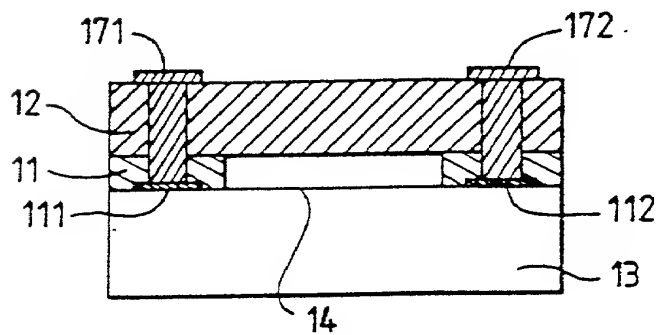


FIG.3

Overall mean (SD)		Overall range	
Age (years)	55.5 (10.5)	35-75	
Gender			
Male	100		
Female	100		
Total	200		
Ethnicity (%)			
White	100		
Black	100		
Hispanic	100		
Asian	100		
Other	100		
Education (%)			
Less than high school	100		
High school	100		
Some college	100		
Bachelor's degree	100		
Master's degree	100		
Doctorate	100		
Occupation (%)			
Unemployed	100		
Retired	100		
Homemaker	100		
Student	100		
Professional	100		
Managerial	100		
Service	100		
Skilled	100		
Unskilled	100		
Marital status (%)			
Married	100		
Divorced	100		
Widowed	100		
Single	100		
Health status (%)			
Excellent	100		
Very good	100		
Good	100		
Fair	100		
Poor	100		
Current smoking status (%)			
Yes	100		
No	100		
Previous smoking status (%)			
Yes	100		
No	100		
Alcohol consumption (%)			
None	100		
Occasional	100		
Regular	100		
Family history of heart disease (%)			
Yes	100		
No	100		
Family history of diabetes (%)			
Yes	100		
No	100		
Family history of hypertension (%)			
Yes	100		
No	100		
Family history of stroke (%)			
Yes	100		
No	100		
Family history of cancer (%)			
Yes	100		
No	100		
Family history of other diseases (%)			
Yes	100		
No	100		
Family history of unknown diseases (%)			
Yes	100		
No	100		
Family history of no diseases (%)			
Yes	100		
No	100		

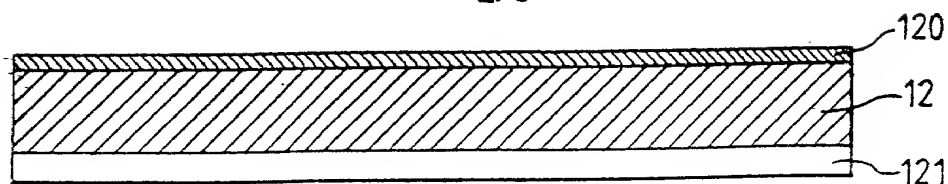


FIG. 4a

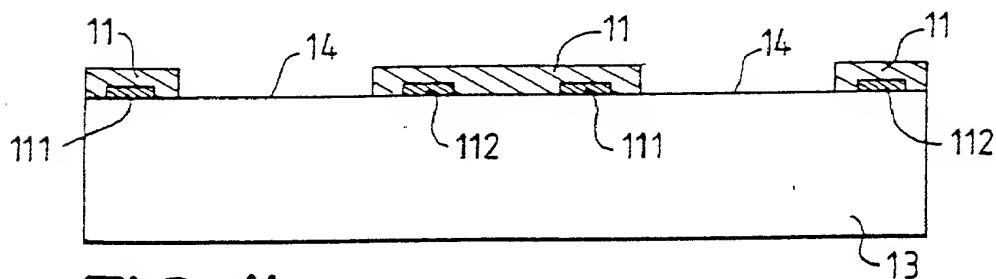


FIG. 4b

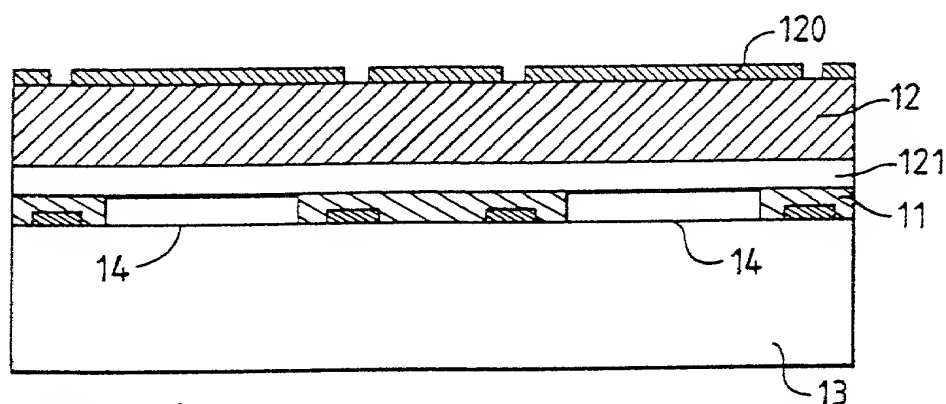


FIG. 4c

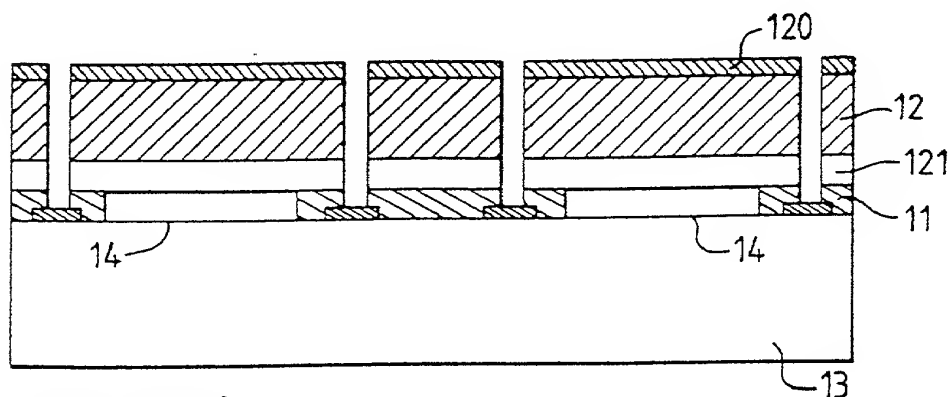
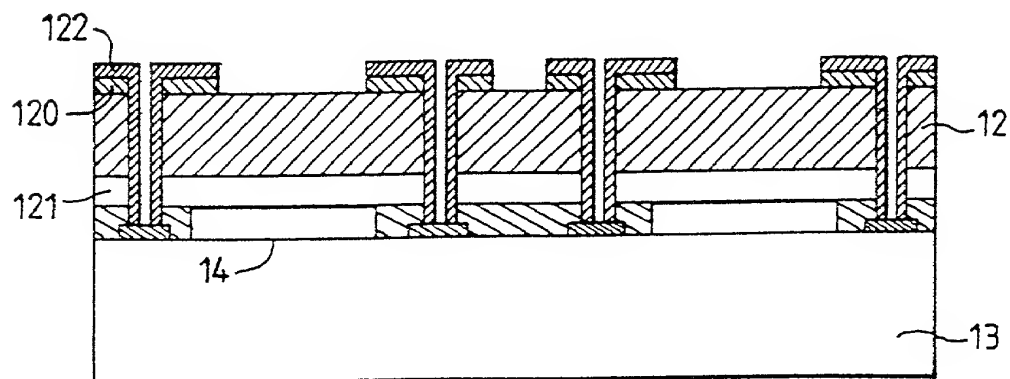
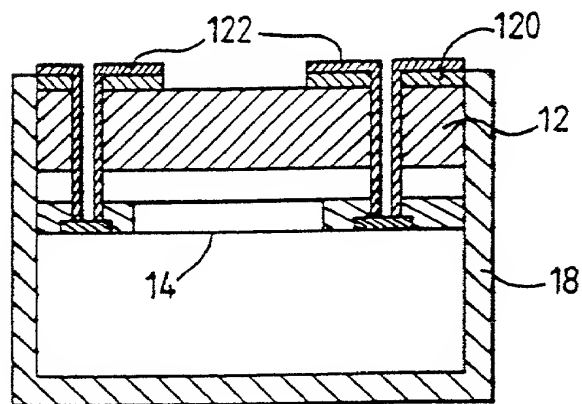
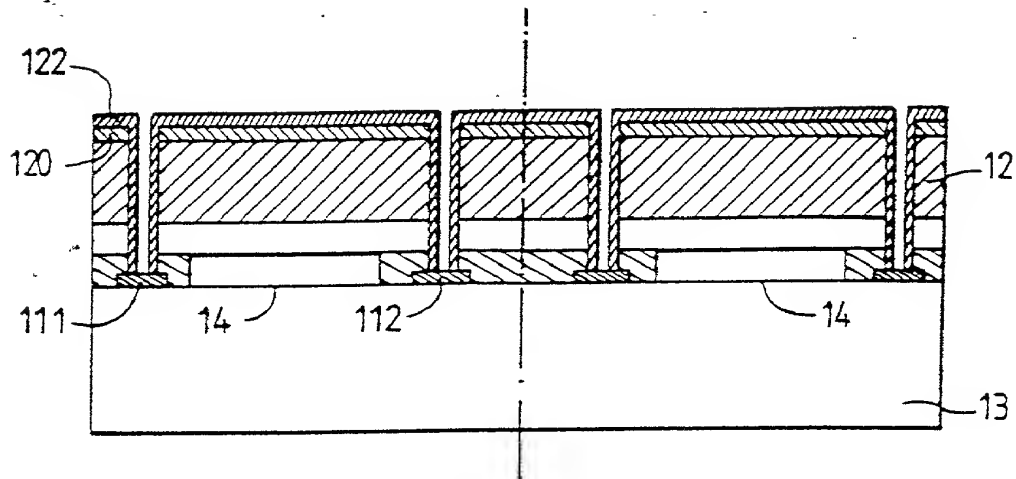


FIG. 4d

1997-1998		1998-1999		1999-2000		2000-2001		2001-2002		2002-2003		2003-2004		2004-2005		2005-2006		2006-2007		2007-2008		2008-2009		2009-2010		2010-2011		2011-2012		2012-2013		2013-2014		2014-2015		2015-2016		2016-2017		2017-2018		2018-2019		2019-2020		2020-2021		2021-2022		2022-2023		2023-2024		2024-2025		2025-2026		2026-2027		2027-2028		2028-2029		2029-2030		2030-2031		2031-2032		2032-2033		2033-2034		2034-2035		2035-2036		2036-2037		2037-2038		2038-2039		2039-2040		2040-2041		2041-2042		2042-2043		2043-2044		2044-2045		2045-2046		2046-2047		2047-2048		2048-2049		2049-2050		2050-2051		2051-2052		2052-2053		2053-2054		2054-2055		2055-2056		2056-2057		2057-2058		2058-2059		2059-2060		2060-2061		2061-2062		2062-2063		2063-2064		2064-2065		2065-2066		2066-2067		2067-2068		2068-2069		2069-2070		2070-2071		2071-2072		2072-2073		2073-2074		2074-2075		2075-2076		2076-2077		2077-2078		2078-2079		2079-2080		2080-2081		2081-2082		2082-2083		2083-2084		2084-2085		2085-2086		2086-2087		2087-2088		2088-2089		2089-2090		2090-2091		2091-2092		2092-2093		2093-2094		2094-2095		2095-2096		2096-2097		2097-2098		2098-2099		2099-2100		2100-2101		2101-2102		2102-2103		2103-2104		2104-2105		2105-2106		2106-2107		2107-2108		2108-2109		2109-2110		2110-2111		2111-2112		2112-2113		2113-2114		2114-2115		2115-2116		2116-2117		2117-2118		2118-2119		2119-2120		2120-2121		2121-2122		2122-2123		2123-2124		2124-2125		2125-2126		2126-2127		2127-2128		2128-2129		2129-2130		2130-2131		2131-2132		2132-2133		2133-2134		2134-2135		2135-2136		2136-2137		2137-2138		2138-2139		2139-2140		2140-2141		2141-2142		2142-2143		2143-2144		2144-2145		2145-2146		2146-2147		2147-2148		2148-2149		2149-2150		2150-2151		2151-2152		2152-2153		2153-2154		2154-2155		2155-2156		2156-2157		2157-2158		2158-2159		2159-2160		2160-2161		2161-2162		2162-2163		2163-2164		2164-2165		2165-2166		2166-2167		2167-2168		2168-2169		2169-2170		2170-2171		2171-2172		2172-2173		2173-2174		2174-2175		2175-2176		2176-2177		2177-2178		2178-2179		2179-2180		2180-2181		2181-2182		2182-2183		2183-2184		2184-2185		2185-2186		2186-2187		2187-2188		2188-2189		2189-2190		2190-2191		2191-2192		2192-2193		2193-2194		2194-2195		2195-2196		2196-2197		2197-2198		2198-2199		2199-2200		2200-2201		2201-2202		2202-2203		2203-2204		2204-2205		2205-2206		2206-2207		2207-2208		2208-2209		2209-2210		2210-2211		2211-2212		2212-2213		2213-2214		2214-2215		2215-2216		2216-2217		2217-2218		2218-2219		2219-2220		2220-2221		2221-2222		2222-2223		2223-2224	
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# Declaration and Power of Attorney for Patent Application

## Déclaration et Pouvoirs pour Demande de Brevet

### French Language Declaration

En tant l'inventeur nommé ci-après, je déclare par le présent acte que:

Mon domicile, mon adresse postale et ma nationalité sont ceux figurant ci-dessous à côté de mon nom.

Je crois être le premier inventeur original et unique (si un seul nom est mentionné ci-dessous), ou l'un des premiers co-inventeurs originaux (si plusieurs noms sont mentionnés ci-dessous) de l'objet revendiqué, pour lequel une demande de brevet a été déposée concernant l'invention intitulée

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

et dont la description est fournie ci-joint à moins

☐ ci-joint

☐ a été déposée le \_\_\_\_\_

sous le numéro de demande des Etats-Unis ou le  
numéro de demande international PCT

\_\_\_\_\_ et modifiée le

\_\_\_\_\_ (le cas échéant).

Je déclare par le présent acte avoir passé en revue et compris le contenu de la description ci-dessus, revendications comprises, telles que modifiées par toute modification dont il aura été fait référence ci-dessus.

Je reconnais devoir divulguer toute information pertinente à la brevetabilité, comme défini dans le Titre 37, § 1.56 du Code fédéral des réglementations.

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

ENCAPSULATED SURFACE ACOUSTIC WAVE

COMPONENT AND METHOD OF COLLECTIVE

FABRICATION

the specification of which:

☐ is attached hereto.

☒ was filed on 7 December 1999

as United States Application Number or PCT  
International Application Number

PCT/FR99/03036 and was amended on

\_\_\_\_\_ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56.

## French Language Declaration

Je revendique par le présent acte avoir la priorité étrangère, en vertu du Titre 35, § 119(a)-(d) ou § 365(b) du Code des Etats-Unis, sur toute demande étrangère de brevet ou certificat d'inventeur ou, en vertu du Titre 35, § 365(a) du même Code, sur toute demande internationale PCT désignant au moins un pays autre que les Etats-Unis et figurant ci-dessous et, en cochant la case, j'ai aussi indiqué ci-dessous toute demande étrangère de brevet, tout certificat d'inventeur ou toute demande internationale PCT ayant une date de dépôt précédant celle de la demande à propos de laquelle une priorité est revendiquée

I hereby claim foreign priority under Title 35, United States Code, § 119(a)-(d) or § 365(b) of any foreign application(s) for patent or inventor's certificate, or § 365(a) of any PCT International application which designated at least one country other than the United States, listed below, and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed

Prior Foreign Application(s)  
Demande(s) de brevet antérieure(s) dans un autre pays

Priority claimed  
Droit de priorité  
revendiqué

<u>98 15478</u> (Number) (Numéro)	<u>FRANCE</u> (Country) (Pays)
(Number) (Numéro)	(Country) (Pays)

<u>8 DECEMBER 1998</u> (Day/Month/Year Filed) (Jour/Mois/Année de dépôt)	<input checked="" type="checkbox"/> <input type="checkbox"/> Yes No Oui Non
(Day/Month/Year Filed) (Jour/Mois/Année de dépôt)	<input type="checkbox"/> <input type="checkbox"/> Yes No Oui Non

Je revendique par le présent acte tout bénéfice, en vertu du Titre 35, § 119(e) du Code des Etats-Unis, de toute demande de brevet provisoire effectuée aux Etats-Unis et figurant ci-dessous.

I hereby claim the benefit under Title 35, United States Code, § 119(e) of any United States provisional application(s) listed below

(Application No.) (N° de demande)	(Filing Date) (Date de dépôt)
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(Application No.) (N° de demande)	(Filing Date) (Date de dépôt)
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Je revendique par le présent acte tout bénéfice, en vertu du Titre 35, § 120 du Code des Etats-Unis, de toute demande de brevet effectuée aux Etats-Unis, ou en vertu du Titre 35, § 365(c) du même Code, de toute demande internationale PCT désignant les Etats-Unis et figurant ci-dessous et, dans la mesure où l'objet de chacune des revendications de cette demande de brevet n'est pas divulgué dans la demande antérieure américaine ou internationale PCT, en vertu des dispositions du premier paragraphe du Titre 35, § 112 du Code des Etats-Unis, je reconnais devoir divulguer toute information pertinente à la brevetabilité, comme défini dans le Titre 37, § 1 56 du Code fédéral des réglementations, dont j'ai pu disposer entre la date de dépôt de la demande antérieure et la date de dépôt de la demande nationale ou internationale PCT de la présente demande

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s), or § 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1 56 which became available between the filing date of the prior application and the national or PCT International filing date of this application.

<u>PCT/FR99/03036</u> (Application No.) (N° de demande)	<u>7 DECEMBER 1999</u> (Filing Date) (Date de dépôt)
(Application No.) (N° de demande)	(Filing Date) (Date de dépôt)

(Status) (patented, pending, abandoned) (Statut) (breveté, en cours d'examen, abandonné)	(Status) (patented, pending, abandoned) (Statut) (breveté, en cours d'examen, abandonné)
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Je déclare par le présent acte que toute déclaration ci-incluse est, à ma connaissance, véridique et que toute déclaration formulée à partir de renseignements ou de suppositions est tenue pour véridique, et de plus, que toutes ces déclarations ont été formulées en sachant que toute fausse déclaration volontaire ou son équivalent est passible d'une amende ou d'une incarcération, ou des deux, en vertu de la Section 1001 du Titre 18 du Code des Etats-Unis, et que de telles déclarations volontairement fausses risquent de compromettre la validité de la demande de brevet ou du brevet délivré à partir de celle-ci

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon

## French Language Declaration

**POUVOIRS:** En tant que l'inventeur cité, je désigne par la présente l'(les) avocat(s) et/ou agent(s) suivant(s) pour qu'ils poursuive(nt) la procédure de cette demande de brevet et traite(nt) toute affaire s'y rapportant avec l'Office des brevets et des marques: (*mentionner le nom et le numéro d'enregistrement*).

**POWER OF ATTORNEY:** As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith: (*list name and registration number*)

Norman F. Oblon, Reg. No. 24,618; Marvin J. Spivak, Reg. No. 24,913; C. Irvin McClelland, Reg. No. 21,124; Gregory J. Maier, Reg. No. 25,599; Arthur I. Neustadt, Reg. No. 24,854; Richard D. Kelly, Reg. No. 27,757; James D. Hamilton, Reg. No. 28,421; Eckhard H. Kuesters, Reg. No. 28,870; Robert T. Pous, Reg. No. 29,099; Charles L. Gholz, Reg. No. 26,395; Vincent J. Sunderdick, Reg. No. 29,004; William E. Beaumont, Reg. No. 30,996; Steven B. Kelber, Reg. No. 30,073; Robert F. Gnuse, Reg. No. 27,295; Jean-Paul Lavalleye, Reg. No. 31,451; Stephen G. Baxter, Reg. No. 32,884; Martin M. Zoltick, Reg. No. 35,745; Robert W. Hahl, Reg. No. 33,893; Richard L. Treanor, Reg. No. 36,379; Steven P. Weihrouch, Reg. No. 32,829; John T. Goolkasian, Reg. No. 26,142; Marc R. Labgold, Reg. No. 34,651; William J. Healey, Reg. No. 36,160; Richard L. Chinn, Reg. No. 34,305; Steven E. Lipman, Reg. No. 30,011; Carl E. Schlier, Reg. No. 34,426; James J. Kulbaski, Reg. No. 34,648; Catherine B. Richardson, Reg. No. 39,007; Richard A. Neifeld, Reg. No. 35,299; and J. Derek Mason, Reg. No. 35,270, with full powers of substitution and revocation.

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	94240 L'HAY LES ROSES FRANCE
Nom complete du second co-inventeur, le cas echeant	Full name of second joint inventor, if any <u>Jean-Marc BUREAU</u> JUNE 26, 2000
Signature de l'inventeur	Second inventor's signature <u>Jean-Marc Bureau</u>
Date	Date
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Nationalité	Citizenship French
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	06560 VALBONNE FRANCE

(Fournier les mêmes renseignements et la signature de tout co-inventeur supplémentaire.)

(Supply similar information and signature for third and subsequent joint inventors.)